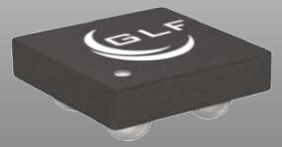
GLF Integrated Power Inc.

Efficient Protected Power

A Silicon Valley IC Company with Leading Technology

April 26, 2017



Company Introduction

- GLF Integrated Power Inc. is a fabless semiconductor company founded in Feb. 2013 in Silicon Valley, dedicated to develop high efficiency power protection IC.
- First product focused on Load Switch application released in 2015
- First customer was acquired in 2015
- A wholly Owned subsidiary company was opened in June, 2016 in Chengdu, China.

GLF Integrated Power
Silicon Valley, CA

- GLF Technology Vision
  We provide the best-class ultra efficient power protection technology for IoT, Wearable, Mobile, Smart Card, Computing, Storage, Communications and Industrial Devices.

GLF Integrated Power
Chengdu, China

The Market "Pain" and Opportunity

Pain

- An absence of Integrated Power Protection solution *limits the development of Industrial/Commercial IoT* due to reliability, size, and cost of discrete solutions

Opportunity

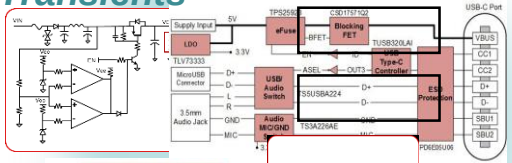
- Safety, power loss (excess heat) and battery life concerns will drive adoption of new/unique ultra-efficient power protection technologies

Why GLF?

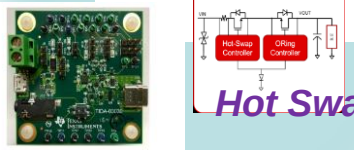
- The *unique team expertise and IP portfolio* focused on low resistance switches, transient and ESD etc. Semiconductor protection solutions.
- Custom Design Strength
- Cost Processes
- Balanced Cost, Efficiency, Robustness

Traditional Power Protection

Transients



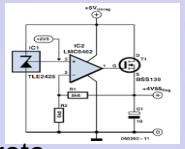
ESD



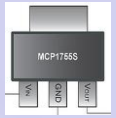
Hot Swap

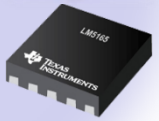
Power Management

LDO



Discrete





IC

Switching Regulator

Complete Power Solution

NOW
Discrete/ some ICs
No Integrated solution!

Small Size Integrated Solution

NOW
Small, Fully Integrated Solutions

Traditional Power Protection
GLF Power System Protection

Power management

GLF Power Preservation

New Complete Power Solution

Images owned by their respective sources

Product & Applications

	Mobile Device	Sensor / IoT	Wearables	Storage	Server / Data Center	Industrial Protection	Smart Card
Power Switch	✓	✓	✓	✓	✓	✓	✓
Battery Protection		✓	✓				✓
System Protection	✓	✓		✓	✓	✓	✓
Power Multiplex	✓	✓	✓	✓	✓	✓	
EFuse	✓	✓		✓	✓	✓	

Competitive Advantages

	Power Switch	Power MUX Switch	EFuse
GLF Technology	• Lowest Resistance/"On" Power losses • Lowest "On" current consumption • Lowest "OFF" current consumption • Best cost structure due to proprietary process • Ultra thin package 0.35mm available	• Lowest Resistance/"On" Power losses • Lowest "On" current consumption • Lowest "OFF" current consumption • Surge Protection • 4A per channel capability for industrial application	• Low Resistance / "On" Power losses • Ultra lower Iq per GLF patent • Adding HV Surge & ESD Protection • System protection module for Industrial like Avionic System
Current Competitors	***Disadvantages Upto:*** • 700X "ON" Power consumption (I_Q) • 100X "OFF" Current consumption (I_{SD}) • 2X Resistance/"On" Power losses (R_{ON}) • No IC package thinner than 0.4mm • *Main Players: TI, Toshiba, On-Semi*	• Higher Ron & Power Consumption • Only 2A current per channel in market • No Surge Protection • *Main Players: TI, On-Semi*	• Higher Power Consumption • Higher Cost • No Surge Protection • *Main Players: TI, On-Semi*
Upcoming Competitors	No New Players • Mature industry • No disruptive technologies • Performance vs Cost	No New Players • Mature industry • No disruptive technologies • High entry barrier	New players are interested in "White Label" product partnership with GLF

Expanding Product Portfolio

Product Type	Description	Product Name	Operating Specs			I_QSmart^{TM} Efficiency Specs			Integrated Features				Package WLCSP SIZE	Status
			Abs Max Voltage (V)	V_{OP} Max Voltage (V)	DC Current Rating (A)	R_{ON} Typ. @ V_{OP} max (mΩ)	I_Q Typ. @ V_{OP} max (nA)	I_{SD} Typ. @ V_{OP} max (nA)	Slew Rate Control	RCB	UVLO	V_{IN} Auto Select		
Load Switch	Best efficiency, Ultra-thin and FastRaise options	GLF71301	6	5.5	1.5	34	1	19	√				0.8x0.8	**Released**
		GLF71301T							√	Ultra-thin			0.8x0.8x 0.35	
		GLF71307							FastRaise				0.8x0.8	
	High Efficiency	GLF71311			2	31	7	25	√				1x1x0.55	
	Ultra-thin	GLF71311T			2	30	1	28	√				1x1x0.35	
	Lowest R_{on}	GLF71321			4	15	3	45	√				1x1.5	
	Lowest I_{SD}	GLF71325			4	18	1	16	√				1x1	
	3-Channel	GLF78161			1/ch	72	3	15	√	Sequenced outputs (Semicustom). Contact GLF for Details			1.6x1	
Battery Protection	Accurate Off-threshold	GLF73510	6	4.2	2	39	0.73uA	9	√		√		1x1	
Power Multiplex (Mux)	2 inputs , 1 output	**GLF741xx**	6	5.5	2	39	8uA@3.3V	1 (Max.)	√	√	√	P	1x1.5	**Contact GLF for details**
System Protection	LS with Reset Timer	**GLF76121/L**	6	5.5	1.5	32 @3.6V	2 @3.6V	4 @3.6V	*Contact GLF for Details*					Released
	LS with Deep Sleep	**GLF76321/L**	6	5.5	1.5	32 @3.6V	2 @3.6V	4 @3.6V						

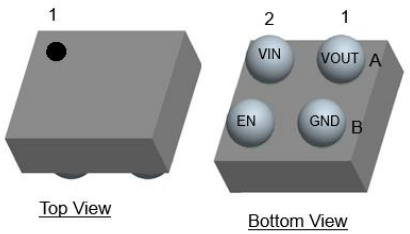
NOTE: Spec values & features set for "Coming Soon" and " Development" devices are provided on a best estimate basis, based on available data at time of estimate. Values are subject to change.

"Integrated Features" Table Key: √ = Feature included, P = Programmable Feature

Typical functional diagram

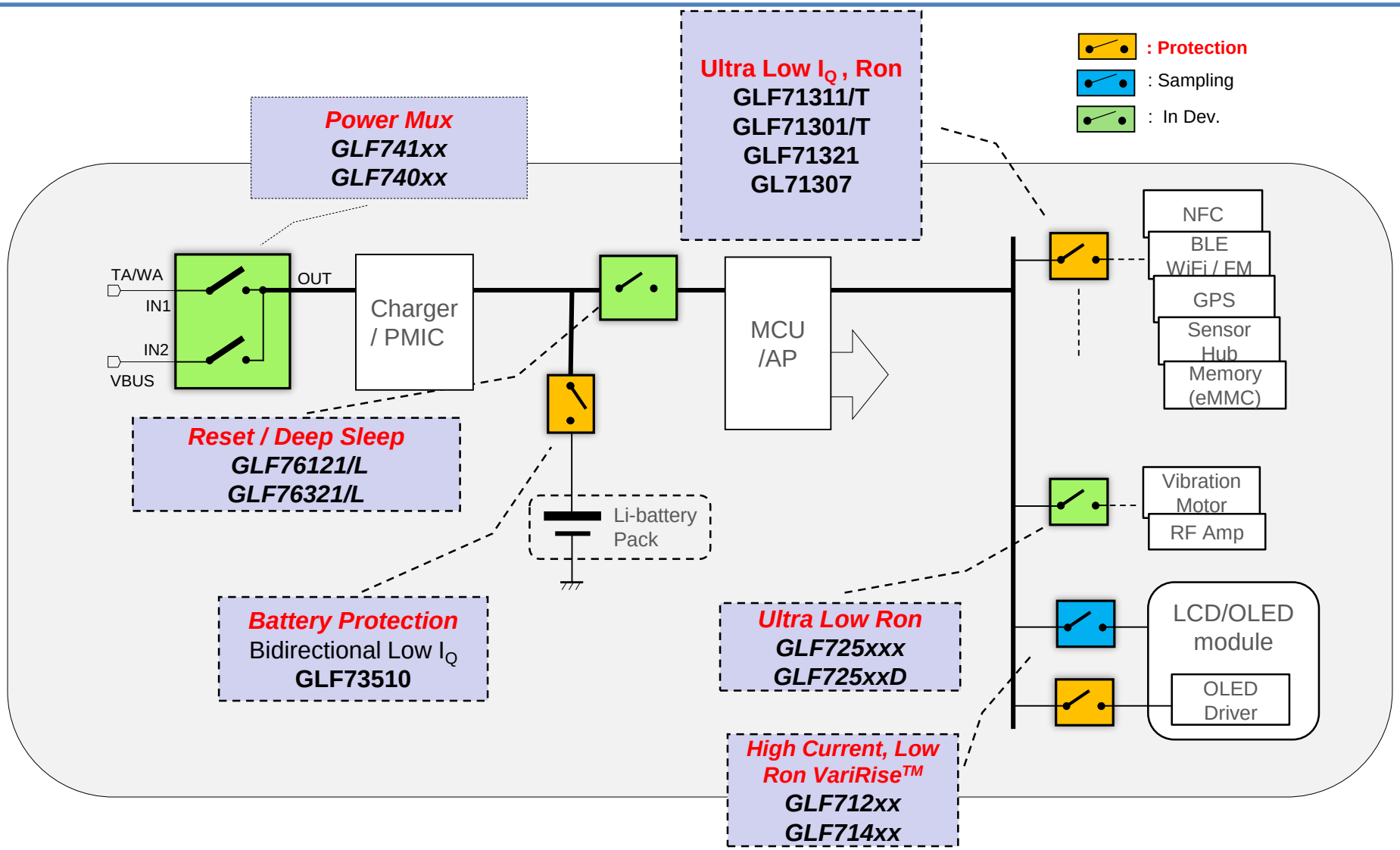
Smart Card Solutions

Some of the GLF products available in 0.35mm thickness WCSP package



0.77mm x 0.77mm x 0.35mm
0.4mm Pitch
WLCSP

0.97mm x 0.97mm x 0.35mm,
0.5mm Pitch
WLCSP



Media Response

The release of GLF's products in APEC 2016 were reported by **13** electronics industry professional media reports, and many other US news media, totally **213** reports or references, including the famous mainstream media Bloomberg, Yahoo Finance, New York Business Journal, Boston Business Journal…

EDN/Planet Analog #2 "Must-Have" Innovation at APEC 2016.

Steve Taranovich praises GLF as a start-up with a great idea backed by a talented team.

Steve Taranovich, Senior Editor

"This is a good load switch story, and I NEVER thought I would say that about a Load Switch"

Aimee Kalnoskas, Editor

"This is the 1st memorable load switch"

David Morison, Founder & Editor

GLF71311 given "Today's Top Stories" status on Powerpulse.net

PowerPulse.net

Thank You

GLF Integrated Power
2901 Tasman Drive
Santa Clara, CA 95054
Tel: +1 408 239 4326
info@glfipower.com
www.glfipower.com